QUIZZES

Practice test 1 Unit 11

10 Questions

7 min

Topics

Atomic Spectra/Line Spectrum

Start Quiz

06 : 59

Q 1/10 7 min Hint

Q : The relation between Rydberg constant (R_H) and ground state energy (E_0) is given by the relation:

A $R_H = \frac{hc}{E_0}$

B $R_H = \frac{E_0}{hc}$

C $R_H = E_0 x hc$

D $R_H = \frac{E_0^2}{hc}$

06 : 55

Q 2/10 7 min Hint

Q : Which of the following is an example of continuous spectra?

A black body radiation spectrum

B molecular spectrum

C atomic spectrum

D none of these

06 : 53

Q 3/10 7 min Hint

Q : Which of the following has the simplest spectrum

A oxygen

B hydrogen

C nitrogen

D neon

06 : 51

Q 4/10 7 min Hint

Q : According to 3rd postulate of Bohr's theory:

A $E_n-E_p=f\lambda$

B $E_n-E_p=he$

C $E_n-E_p=hf$

D $E_p-E_n=hf$

06 : 49

Q 5/10 7 min Hint

Q :

Figure shows the energy levels P, Q, R, S and G of an atom where G is the ground state. A red line in the emission spectrum of the atom can be obtained by an energy level change from Q to S. A blue line can be obtained by following energy level change

A P to Q

B Q to R

C R to S

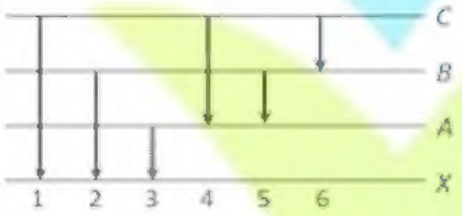
D R to G

06 : 33

Q 6/10 7 min Hint

Q :

The figure indicates the energy level diagram of an atom and the origin of six spectral lines in emission (e.g. line no. 5 arises from the transition from level B to A). The following spectral lines will also occur in the absorption spectrum



A 1, 2, 3

B 1, 2, 3, 4, 5, 6

C 1, 4, 6

D 4, 5, 6

06 : 31

Q 7/10 7 min Hint

Q :

The ratio of the frequencies of the long wavelength limits of Lyman and Balmer series of hydrogen spectrum is

A 27 : 5

B 5 : 27

C 4 : 1

D 1 : 4

06 : 29

Q 8/10 7 min Hint

Q :

In a hydrogen atom, which of the following electronic transitions would involve the maximum energy change

A From n = 2 to n = 1

B From n = 3 to n = 1

C From n = 4 to n = 2

D From n = 3 to n = 2

06 : 27

Q 9/10 7 min Hint

Q :

The ratio of the largest to shortest wavelengths in Lyman series of hydrogen spectra is

A 25/9

B 17/6

C 9/5

D 4/3

Q :

According to the Rutherford?s atomic model, the electrons inside the atom are

- Stationary
- Not stationary
- Centralized
- None of these

QUIZ RESULT

Practice test 1 Unit 11

0/10

0%

Incorrect 1/10

Q : The relation between Rydberg constant (R_H) and ground state energy (E_0) is given by the relation:

$R_H = \frac{hc}{E_0}$

$R_H = \frac{E_0}{hc}$

$R_H = E_0 x hc$

$R_H = \frac{E_0^2}{hc}$

Explanation

Simple formula

Incorrect

2/10

Q : Which of the following is an example of continuous spectra?

A black body radiation spectrum

B molecular spectrum

C atomic spectrum

D none of these

Explanation

Information

Incorrect

3/10

Q : Which of the following has the simplest spectrum

oxygen

hydrogen

nitrogen

neon

Explanation

Information

Correct

Unattempted

Incorrect

4/10

Q : According to 3rd postulate of Bohr's theory:

$E_n-E_p=f$

$E_n-E_p=he$

$E_n-E_p=hf$

$E_p-E_n=hf$

Explanation

Formula

Q :

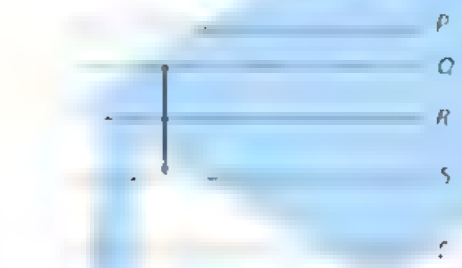
Figure shows the energy levels P, Q, R, S and G of an atom where G is the ground state. A red line in the emission spectrum of the atom can be obtained by an energy level change from Q to S. A blue line can be obtained by following energy level change

P to Q

Q to R

R to S

R to G



A. P to Q

B. Q to R

C. R to S

D. R to G

Explanation

If E is the energy radiated in transition then

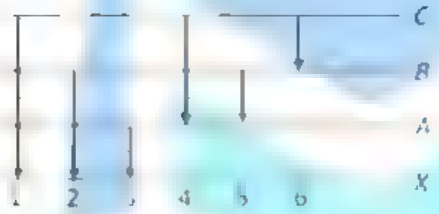
$E_{R\,.\,G} > E_{Q\,.\,S} > E_{R\,.\,S} > E_{Q\,.\,R} > E_{P\,.\,Q}$

For getting blue line energy radiated should be maximum

$(E \propto 1/\lambda)$

Hence (d) is the correct option.

The figure indicates the energy level diagram of an atom and the origin of six spectral lines in emission (e.g. line no. 5 arises from the transition from level B to A). The following spectral lines will also occur in the absorption spectrum



- 1, 2, 3
- 1, 2, 3, 4, 5, 6
- 1, 4, 6
- 4, 5, 6

Explanation

The absorption lines are obtained when the electron jumps from ground state (n = 1) to the higher energy states. Thus only 1, 2 and 3 lines will be obtained.

Q :

The ratio of the frequencies of the long wavelength limits of Lyman and Balmer series of hydrogen spectrum is

- 27 : 5
- 5 : 27
- 4 : 1
- 1 : 4

Explanation

For Lyman series $\frac{1}{\lambda_{Lyman}} = \frac{}{}$

For Balmer series $\frac{1}{\lambda_{Balmer}} = \frac{}{\lambda}$

Q :

The ratio of the frequencies of the long wavelength limits of Lyman and Balmer series of hydrogen spectrum is

- 27 : 5
- 5 : 27
- 4 : 1
- 1 : 4

Explanation

$$\nu_{Lyman} = \frac{c}{\lambda_{max}} = Rc\left[\frac{1}{(1)^2} - \frac{1}{(2)^2}\right]$$

$$\nu_{Balmer} = \frac{c}{\lambda_{max}} = Rc\left[\frac{1}{(2)^2} - \frac{1}{(3)^2}\right]$$

Q :

The ratio of the frequencies of the long wavelength limits of Lyman and Balmer series of hydrogen spectrum is

- 27 : 5
- 5 : 27
- 4 : 1
- 1 : 4

Explanation

$$\frac{}{ax} = Rc\left[\frac{1}{(1)^2} - \frac{1}{(2)^2}\right] = \frac{3Rc}{4}$$

$$\frac{}{x} = Rc\left[\frac{1}{(2)^2} - \frac{1}{(3)^2}\right] = \frac{5Rc}{36}$$

Incorrect

6/10

Q :

In a hydrogen atom, which of the following electronic transitions would involve the maximum energy change

From n = 2 to n = 1

From n = 3 to n = 1

From n = 4 to n = 2

From n = 3 to n = 2

Q :

The ratio of the largest to shortest wavelengths in Lyman series of hydrogen spectra is

25/9

17/6

9/5

4/3

Explanation

For Lyman series $\frac{1}{\lambda_{max}} = R$

$$\frac{1}{\lambda_{min}} = R\left[\frac{1}{1^2} - \frac{1}{\infty^2}\right] = \frac{R}{1} \Rightarrow \frac{\lambda_{ma}}{\lambda_{mi}}$$

Q :

The ratio of the largest to shortest wavelengths in Lyman series of hydrogen spectra is

25/9

17/6

9/5

4/3

Explanation

For Lyman series $\frac{1}{\lambda_{max}} = R\left[\frac{1}{1^2} - \frac{1}{2^2}\right]$

$$R\left[\frac{1}{1^2} - \frac{1}{\infty^2}\right] = \frac{R}{1} \Rightarrow \frac{\lambda_{max}}{\lambda_{min}} = \frac{4}{3}$$

Q :

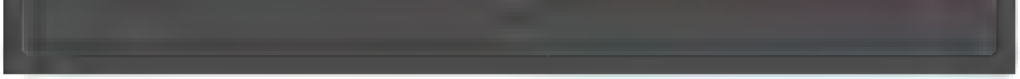
According to the Rutherford?s atomic model, the electrons inside the atom are

Stationary

Not stationary

Centralized

None of these



QUIZZES

Practice test 2 Unit 11

Q : X – Rays can not produce

- Photo Electric Effect
- Compton's Effect
- Pair Production
- All of these

Q : X-rays are diffracted by a crystal but not by a diffraction grating because _____

- The ions in a crystal are well arranged.
- The lines in a diffraction grating cannot reflect X-rays.
- The penetration power of X-rays is high in a diffraction grating.
- The wavelengths of X-rays are of the same order of magnitude as the separation between atoms in a crystal

Q : The target metal in x-ray tube is made of

- alumin um
- gold
- tungsten
- silver

Q : X-rays can cause

- cancer
- damage the living tissues
- both a and b
- none of these

Q :

A metal block is exposed to beams of X-ray of different wavelength. X-rays of which wavelength penetrate most

a) 2 Å

b) 4 Å

c) 6 Å

d) 6 Å

Q :

The voltage applied across an X-rays tube is nearly

- 10 V
- 100 V
- 10000 V
- 10^6 V

7/10 7 min Hint

Q :

The characteristic X-ray radiation is emitted, when

- The electrons are accelerated to a fixed energy
- The source of electrons emits a monoenergetic beam
- The bombarding electrons knock out electrons from the inner shell of the target atoms and one of the outer electrons falls into this vacancy
- The valence electrons in the target atoms are removed as a result of the collision

Q :

When the accelerating vo tage applied on the electrons increased beyond a critical value

- Only the intensity of the various wavelengtns is increased
- Only the wavelength of characteristic relation is affected
- The spectrum of white radiation is unaffected
- The intensities of characteristic lines relative to the white spectrum are increased but there is no change in their wavelengtn

Q :

The binding energy of the innermost electron in tungsten is 40 keV. To produce characteristic X-rays using a tungsten target in an X-rays tube the potential difference V between the cathode and the anti-cathode should be

A V< 40 kV

B V ≤ 40 kV

C V > 40 kV

D V >/< 40 kV

Q :

According to Mosley's law, the frequency of a spectral line in X-ray spectrum varies as

A. Atomic number of the element

B. Square of the atomic number of the element

C. Square root of the atomic number of the element

D. Fourth power of the atomic number of the element

QUIZ RESULT

Practice test 2 Unit 11

0/10

0%

Incorrect 1/10

Q : X – Rays can not produce

- Photo Electric Effect
- Compton's Effect
- Pair Production
- All of these

Explanation

X-ray cannot produce pair production, because for pair production high energy photon gamma ray photons are required.

Practi

Correct

Unattempted

Incorrect

2/10

Q : X rays are diffracted by a crystal but not by a diffraction grating because _____

A) The ions in a crystal are well arranged

B) The lines in a diffraction grating cannot reflect X-rays.

C) The penetration power of X-rays is high in a diffraction grating.

D) The wavelengths of X-rays are of the same order of magnitude as the separation between atoms in a crystal.

Explanation

Diffraction only happen when size of wavelength is of the order of separation between the grating So, X-rays are shorter in wavelength. So, are unable to reflect through grating.

Incorrect

3/10

Q : The target metal in x ray tube is made of

alumin um

gold

tungsten

silver

Incorrect 4/10

Q : X rays can cause

cancer

damage the living tissues

both a and b

none of these

Incorrect

5/10

Q :

A metal block is exposed to beams of X-ray of different wavelength. X-rays of which wavelength penetrate most

2 Å

4 Å

6 Å

6 Å

Explanation

Penetrating power is greater for lower wavelength.

6/10

Q :

The voltage applied across an X-rays tube is nearly

10 V

100 V

10000 V

10^6 V

Explanation

The voltage applied across the X-ray tube is of the range of 10 kV - 80 kV

Correct : Unattempted

Incorrect : 7/10

Q :

The characteristic X-ray radiation is emitted, when

The electrons are accelerated to a fixed energy

The source of electrons emits a monoenergetic beam

The bombarding electrons knock out electrons from the inner shell of the target atoms and one of the outer electrons falls into this vacancy

The valence electrons in the target atoms are removed as a result of the collision

Incorrect

8/10

Q :

When the accelerating vo tage applied on the electrons increased beyond a critical value

- Only the intensity of the various wavelengtns is increased
- Only the wavelength of characteristic relation is affected
- The spectrum of white radiation is unaffected
- The intensities of characteristic lines relative to the white spectrum are increased but there is no change in their wavelengtn

Correct

Unattempted

Incorrect

9/10

Q :

The binding energy of the innermost electron in tungsten is 40 keV. To produce characteristic X-rays using a tungsten target in an X-rays tube the potential difference V between the cathode and the anti-cathode should be

V< 40 kV

V ≤ 40 kV

V > 40 kV

V >/< 40 kV

Explanation

Applied voltage must be greater than binding energy.

Incorrect 10/10

Q :

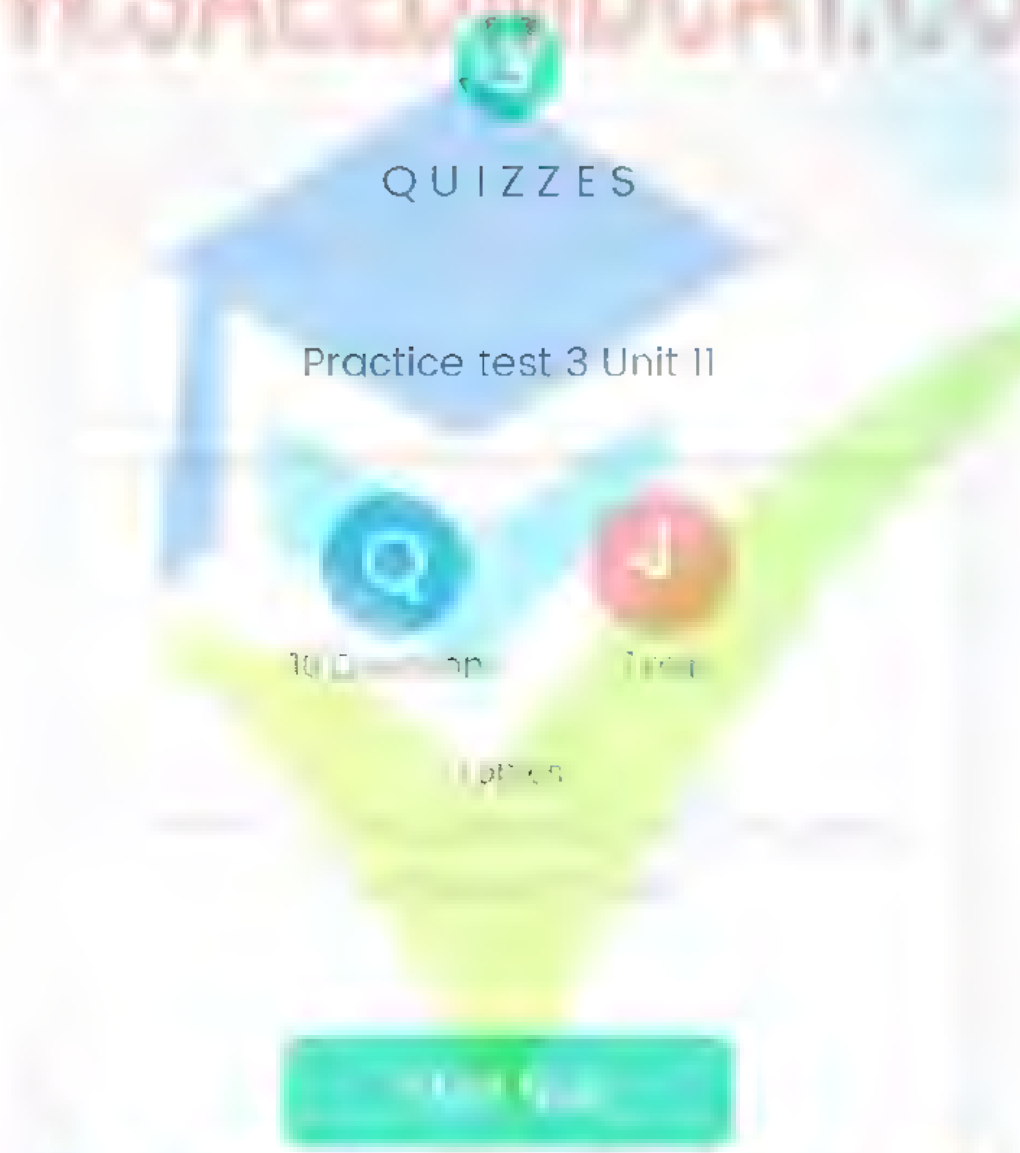
According to Mosley s law, the frequency of a spectral line in X-ray spectrum varies as

Atomic number of the element

Square of the atomic number of the element

Square root of the atomic number of the element

Fourth power of the atomic number of the element



Q :

The X-ray beam coming from an X-ray tube will be

A. Monochromatic

B. Having all wavelengths smaller than a certain maximum wavelength

C. Having all wavelengths larger than a certain minimum wavelength

D. Having all wavelengths lying between a minimum and a maximum wavelength

Q :

The penetrating power of X-rays increases with the

- Increase in its velocity
- Increase in its frequency
- Increase in its intensity
- Decrease in its velocity

Q :

X-rays are produced due to

- Break up of molecules
- Changing in atomic energy level
- Changing in nuclear energy level
- Radioactive d sintegration

Q :

The ratio of the energy of an X-ray photon of wavelength 1 Å to that of visible light of wavelength 5000 Å is

1: 5000

5000 : 1

1 :25 $\times 10^6$

25 $\times 10^6$

Q :

The most penetrating radiation out of the following is

- X-rays
- β-rays
- α-particles
- γ-rays

Q :

X-rays cannot be deflected by means of an ordinary grating due to

- Large wavelength
- High speed
- Short wavelength
- None of these

Q :

When X rays pass through a strong uniform magnetic field, Then they

A. Do not get deflected at all

B. Get deflected in the direction of the field

C. Get deflected in the direction opposite to the field

D. Get deflected in the direction perpendicular to the field

Q :

X-ray will travel minimum distance in

- Air
- Iron
- Wood
- Water

Q :

X-rays when incident on a metal

A. Exert a force on it

B. Transfer energy to it

C. Transfer pressure to it

D. All of the above

Q :

Absorption of X-ray is maximum in which of the following different sheets

- Copper
- Gold
- Beryllium
- Lead

QUIZ RESULT

Practice test 3 Unit 11

0/10

0%

Incorrect

1/10

Q :

The X-ray beam coming from an X-ray tube will be

Monochromatic

Having all wavelengths smaller than a certain maximum wavelength

Having all wavelengths larger than a certain minimum wavelength

Having all wavelengths lying between a minimum and a maximum wavelength

Correct

Unattempted

Incorrect

2/10

Q :

The penetrating power of X-rays increases with the

Increase in its velocity

Increase in its frequency

Increase in its intensity

Decrease in its velocity

Explanation

E/t=P=hf/t

i.e. Penetrating power directly proportional to energy and Frequency

Correct

Unattempted

Incorrect

3/10

Q :

X-rays are produced due to

Break up of molecules

Changing in atomic energy level

Changing in nuclear energy level

Radioactive d sintegration

Correct

Incorrect

Attempted

Q :

The ratio of the energy of an X-ray photon of wavelength 1 Å to that of visible light of wavelength 5000 Å is

1: 5000

5000 : 1

1 :25 ×10^6

25 ×10^6

Explanation

Energy
E=hf

$$= h\frac{c}{\lambda} \Big| \because \frac{E_1}{E_2} = \frac{\lambda_2}{\lambda_1} = \frac{5000}{1}$$

Incorrect

5/10

Q :

The most penetrating radiation out of the following is

X-rays

β-rays

α-particles

γ-rays

Explanation

Penetration is directly proportional to the energy of radiations.

Incorrect

6/10

Q :

X-rays cannot be deflected by means of an ordinary grating due to

Large wavelength

High speed

Short wavelength

None of these

Correct Unattempted

Incorrect Q 7/10

Q :

When X rays pass through a strong uniform magnetic field, Then they

A Do not get deflected at all

B Get deflected in the direction of the field

C Get deflected in the direction opposite to the field

D Get deflected in the direction perpendicular to the field

Explanation

Because X-rays are electromagnetic (Neutral) in nature.

Correct Unattempted

Incorrect Q 8/10

Q :

X-ray will travel minimum distance in

A Air

B Iron

C Wood

D Water

Practice test 3 Unit 11

Correct

Unattempted

Incorrect

Q 9/10

Q :

X-rays when incident on a metal

A Exert a force on it

B Transfer energy to it

C Transfer pressure to it

D All of the above

Correct

Unattempted

Incorrect

Q 10/10

Q :

Absorption of X-ray is maximum in which of the following different sheets

A Copper

B Gold

C Beryllium

D Lead